

Translation

PATENT COOPERATION TREATY

PCT/JP2003/016034



PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference NE-70135WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/JP2003/016034	International filing date (day/month/year) 15 December 2003 (15.12.2003)	Priority date (day/month/year) 16 December 2002 (16.12.2002)
International Patent Classification (IPC) or national classification and IPC H01L 29/812, 21/338		
Applicant NEC CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 15 December 2003 (15.12.2003)	Date of completion of this report 06 September 2004 (06.09.2004)
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP2003/016034

I. Basis of the report

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed
- ☐ the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the claims:
 pages _____, as originally filed
 pages _____, as amended (together with any statement under Article 19
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the drawings:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP03/16034

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-18	YES
	Claims		NO
Inventive step (IS)	Claims	4-7, 10-13, 17	YES
	Claims	1-3, 8-9, 14-16, 18	NO
Industrial applicability (IA)	Claims	1-18	YES
	Claims		NO

2. Citations and explanations

Document 1: JP, 9-307097, A (SONY CORPORATION), 28 November 1997 (28.11.97), paragraphs [0031]~[0055], Figs. 4~9

Document 2: US, 2002-0005528, A1 (FUJITSU QUANTUM DEVICES LIMITED), 17 January 2002 (17.01.02), full text, all drawings

Document 3: JP, 2000-323495, A (SONY CORPORATION), 24 November 2000 (24.11.00), full text, all drawings

Document 4: The Effect of Dielectric Stress on the Electrical Characteristics of AlGaIn/GaN Heterostructure Field-Effect Transistors (HFETs) (W.S. TAN, ET. AL.), The 10th IEEE International Symposium on Electron Devices for Microwave and Optoelectronic Applications, November 2002, pages 130-135

Document 5: JP, 2001-189324, A (RICOH COMPANY, LTD.), 10 July 2001 (10.07.01), full text, all drawings

Document 6: JP, 2002-359256, A (FUJITSU LIMITED), 13 December 2002 (13.12.02), full text, all drawings

Claims 1-3

The subject matter of claims 1-3 does not involve an inventive step on account of document 1, document 2, and document 3 cited in the ISR.

Document 1 describes a field effect transistor comprising a group III nitride semiconductor structure with a heterojunction, source and drain electrodes formed at a separation on this semiconductor structure, a gate electrode disposed between the aforesaid source electrode and the aforesaid drain electrode, and an insulating film formed on the aforesaid group III nitride semiconductor layer. Document 2 describes a technique for increasing the voltage resistance of a field effect transistor by means of a gate electrode that has a field plate formed on an insulating film and extending in an eave-like manner to the drain electrode side. Document 3 describes a technique for reducing impurity diffusion depth randomness by covering the surface of a field effect transistor formed on a compound semiconductor with a laminated film consisting of a silicon nitride film 20 nm in thickness and a silicon dioxide film 20 nm in thickness. Employing the laminated film described in document 2 as the gate electrode of document 1 could easily be conceived by a person skilled in the art.

Claims 8-9

The subject matter of claim 8 does not involve an inventive step on account of document 1, document 2, document 4, and document 5 cited in the ISR.

Document 4 describes an example in which a silicon oxynitride film is used as the passivation film of an AlGaIn/GaN heterojunction field effect transistor. Document 5 describes a technique for reducing parasitic capacitance by using an insulating film whose relative dielectric constant is 3.5 or less near the gate electrode. Employing the insulating film described in document 4 and document 5

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP03/16034

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of Box V.2:

as the insulating film of document 1 could easily be conceived by a person skilled in the art.

Claim 14-16, 18

The subject matter of claims 14-16 and 18 does not involve an inventive step on account of document 1 through document 6 cited in the ISR.

Document 6 describes a cap layer comprising a channel layer consisting of $\text{In}_x\text{Ga}_{1-x}\text{N}$, an electron supply layer consisting of $\text{Al}_y\text{Ga}_{1-y}\text{N}$, a contact layer consisting of an undoped AlGaIn layer, and GaN . Employing the structure described in document 6 in the GaN field effect transistor of document 1 could easily be conceived by a person skilled in the art.

The subject matter of claims 4-7, 10-13, and 17 is neither described nor suggested in documents 1-6 cited in the ISR.